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Economic Research Service

Natural Resources and Environment Division

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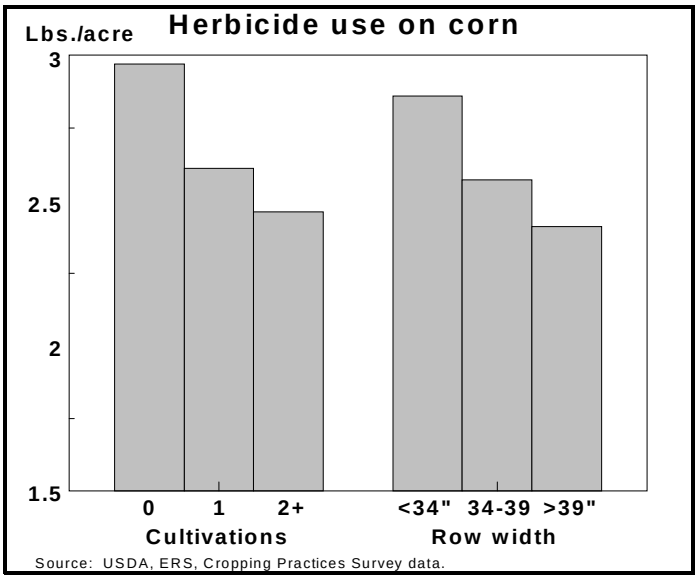
Pest Management on Major Field Crops

- **Pesticides were applied in 1995 to nearly all fields in corn, soybeans, cotton, potatoes, and spring and durum wheat, but to less than 60 percent of the winter wheat acreage.**
- **Herbicides were the most used pesticides accounting for 69 percent of the weight of all pesticide active ingredients and 78 percent of the total number of acre-treatments.**
- **Insecticide use on cotton and fungicide and other pesticide use on potatoes were the most intensive uses of pesticides.**

The 1995 Cropping Practices Survey collected information on pesticide use and other pest management in the major States producing corn, soybeans, cotton, wheat, and fall potatoes. Almost 90 percent of the acreage of these crops in the surveyed States was treated with herbicides, but only 17 percent received insecticides and less than 5 percent received any fungicides, fumigants, growth regulators, harvest aids, or other pesticides (table 1). During the crop production year, an average of 2.4 pounds of pesticide active ingredients were applied to each treated acre, but the average rates ranged from 5 ounces on wheat to over 60 pounds per acre on potatoes. The average number of acre-treatments per treated acre (number of active ingredients applied to each acre plus any repeat applications) ranged from 2 on wheat to 11 on cotton and potatoes. Soil fumigants and vine killers, which were applied to a relatively small share of potato acres at 100 to 300 pounds per acre, accounted for most of the pesticide used on potatoes.

Herbicides used on land in corn and soybeans accounted for 58 percent of the pesticides used on the surveyed crops. Nearly all corn and soybean acres were treated with herbicides, averaging about 2.5 different herbicide active ingredients per treated acre. Herbicide use was the most intense on land under no-till, with no post-plant cultivations, or planted in narrow rows; and least intense on corn area previously in sod, tilled with a moldboard plow, receiving several post-plant cultivations, or planted in wide rows (table 2). Soybeans grown in rotation with small grains, including double cropping, had a smaller share of acres treated with herbicides than soybeans in rotation with corn or other row crops.

Cotton insecticides accounted for over half of all insecticides applied to the surveyed field crops (table 1). Most of the cotton area, except in Texas and Arkansas, received several insecticide treatments. On



average, 8 acre-treatments and 4 different insecticide ingredients were used for cotton insect control during the production year. Most cotton was grown in a continuous row crop rotation, using a conventional tillage system (either with or without the moldboard plow), and several cultivations for weed control. Land tilled with the moldboard plow received the lowest number of insecticide acre-treatments and the least amount of insecticide (table 3).

Only 56 percent of winter wheat received any herbicides, and use varied widely between regions and production practices. Winter wheat grown in rotation with row crops—a rotation confined mostly to eastern production States—had the lowest share of acres treated with herbicides (28 percent), while winter wheat in a rotation with fallow—mostly in the Plains States—had the highest share of acres treated (69 percent).

Most acres in major field crops were scouted for pests, ranging from 86-88 percent of cotton and fall potatoes to 77-82 percent of corn, soybeans, and wheat (table 1).

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About AREI UPDATES

AREI UPDATES is a periodic series that supplements and updates information in **Agricultural Resources and Environmental Indicators (AREI)**, USDA, ERS, AH-705, Dec. 1994. **UPDATES** report recent data from surveys of farm operators and others knowledgeable about changing agricultural resource use and conditions, with only minimal interpretation or analysis. Please contact the individual listed at the end of the text for additional information about the data in this **UPDATE**. If you would like to be added to the mailing list or have other questions about **AREI UPDATES** or **AREI**, contact Richard Magleby, (202) 219-0436. [rmagleby@econ.ag.gov]. **AREI UPDATES** are available on the ERS web site—http://www.econ.ag.gov/Briefing/arei/arei.htm—and on AutoFax (202) 219-1107 (wait until voice prompt gives all options, then press 4; when prompted again, enter 20200 to get a listing of available issues).

Table 1—Pest management practices on major field crops, 1995

Data Item	Units [1]	Winter wheat (13 States)	Soybeans (14 States)	Upland cotton (6 States)	Corn (17 States)	Spring wheat (4 States)	Durum wheat (N. Dakota)	Fall potatoes (11 States)	Total [2]
Planted area [3]	(1,000 ac.)	34,265	51,840	11,650	64,105	15,750	2,950	1,147	181,707
Amount of pesticide applied:									
Herbicides	1,000 lbs.	5,406	56,439	22,821	167,751	8,006	1,810	2,384	264,615
Insecticides	1,000 lbs.	679	418	20,606	13,219	18	id	2,557	37,497
Fungicides	1,000 lbs.	id	id	763	id	275	id	6,535	7,718
Other pesticides	1,000 lbs.	id	id	15,842	id	id	id	59,872	75,714
Total [2]	1,000 lbs.	6,193	56,870	60,031	180,987	8,299	1,815	71,347	385,543
Avg. amount applied per treated acre	lbs.	0.31	1.13	5.20	2.89	0.56	0.64	62.62	2.36
Share of planted area receiving pesticides:									
Herbicides	Percent	56	97	97	97	95	96	86	89
Insecticides	Percent	5	2	76	28	*	*	88	17
Fungicides	Percent	*	*	9	*	3	2	85	2
Other pesticides	Percent	*	*	56	*	*	*	57	4
Any pesticides	Percent	58	98	99	98	95	96	99	90
Average number of acre-treatments per treated acre: [4]									
Herbicides	Number	2.0	2.8	3.1	2.5	2.4	2.4	2.0	2.6
Insecticides	Number	1.1	1.1	7.9	1.2	id	id	2.6	3.1
Fungicides	Number	id	id	1.9	id	1.3	1.0	7.5	3.4
Other pesticides	Number	id	id	2.7	id	id	id	1.6	2.6
Any pesticides	Number	2.0	2.9	10.7	2.8	2.5	2.4	11.3	3.3
Average application rate per acre-treatment:									
Herbicides	lbs./ac.-trt.	0.14	0.41	0.69	1.17	0.25	0.27	1.18	0.68
Insecticides	lbs./ac.-trt.	0.34	0.41	0.32	0.69	id	id	1.09	0.57
Fungicides	lbs./ac.-trt.	id	id	0.40	id	0.44	id	0.90	0.52
Other Pesticides	lbs./ac.-trt.	id	id	0.90	id	id	id	66.16	6.85
Total	lbs./ac.-trt.	0.16	0.41	0.56	1.11	0.25	0.27	7.32	0.69
Area by number of herbicide applications:									
No applications	Percent	44	3	3	3	5	4	14	11
1 application	Percent	49	41	35	55	78	59	55	51
2 applications	Percent	6	44	28	35	16	29	26	30
3 or more applications	Percent	1.1	12	34	6	*	7	5	9
Avg. number of applications/treated acre	Number	1.2	1.8	2.6	1.5	1.2	1.5	1.4	1.6
Area by number of herbicide ingredients applied:									
1 active ingredient	Percent	20	12	37	14	19	19	28	17
2 active ingredients	Percent	25	35	23	43	41	39	42	36
3 active ingredients	Percent	9	28	14	30	20	28	15	23
4 or more ingredients	Percent	3	22	24	10	15	10	*	14
Avg. number of ingredients/treated acre	Number	1.9	2.7	2.7	2.4	2.4	2.4	1.9	2.5
Area by number of insecticide applications:									
No applications	Percent	95	98	24	72	100	100	12	83
1 application	Percent	5	2	13	24	*	*	33	11
2 to 5 applications	Percent	*	*	29	32	*	*	48	5
6 or more applications	Percent	*	*	34	*	*	*	8	2
Avg. number of applications/treated acre	Number	1.0	1.1	6.2	1.2	1.0	*	2.5	2.7
Area by number of insecticide ingredients applied:									
1 active ingredient	Percent	5	2	16	25	*	*	40	11
2 to 5 active ingredients	Percent	*	*	42	3	*	*	46	5
6 or more ingredients	Percent	*	*	19	*	*	*	*	*
Avg. number of ingredients/treated acre	Number	1.0	1.1	3.8	1.1	1.0	*	1.9	1.9
Area by tillage system:									
Conventional without moldboard plow	Percent	67	43	85	51	67	65	na	55
Moldboard plow	Percent	11	6	13	9	8	3	na	8
Mulch tillage > 30% residue	Percent	15	21	*	18	21	28	na	18
No till	Percent	7	29	1	18	5	4	na	16
Ridge till	Percent	na	1	*	3	na	na	na	na
Area by number of cultivations:									
No cultivations	Percent	na	60	2	35	na	na	6	na
One cultivation	Percent	na	23	6	46	na	na	42	na
Two cultivations	Percent	na	15	26	17	na	na	28	na
Three or more cultivations	Percent	na	2	66	1	na	na	24	na
Area by cropping pattern:									
Continuous same crop	Percent	43	10	68	21	16	23	4	25
Wheat fallow rotation	Percent	21	na	na	na	18	28	na	6
Corn soybean rotation	Percent	na	58	na	47	na	na	na	33
Cotton sorghum rotation	Percent	na	na	5	na	na	na	na	*
Other row crop rotations	Percent	na	15	16	16	na	na	19	11
Other small grains rotation	Percent	*	na	na	na	9	12	na	*
Row crops and small grain rotation	Percent	15	4	2	3	39	18	45	9
Idle or fallow in rotation	Percent	18	4	7	7	13	14	23	9
Hay, pasture, other use in rotation	Percent	*	*	*	2	*	*	1	1
Double-cropped wheat and soybeans	Percent	1	7	na	na	na	na	na	2
Area scouted for pests [5]	Percent	80	77	88	78	82	77	86	79

* Indicates less than 1 percent. id = insufficient data to develop estimate. na = not available [1]When units are reported as a percent they represent percentage of planted area. [2] Includes amounts of those pesticides for which insufficient data existed to develop estimates by type. [3]Represented area: corn (DE, GA, IL, IN, IA, KS, KY, MI, MN, MO, NE, NC, OH, PA, SD, TX, WI); soybeans (AR, GA, IL, IN, IA, KY, LA, MN, MS, MO, NE, NC, OH, TN); cotton (AZ, AR, CA, LA, MS, TX); winter wheat (CO, ID, IL, KS, MO, MT, NE, OH, OK, OR, SD, TX, WA); spring wheat (MN, MT, ND, SD); durum wheat (ND); potatoes (CO, ID, ME, MI, MN, NY, ND, OR, PA, WA, WI). [4]An acre-treatment is the number of different active ingredients applied per acre times the number of repeat applications. A single treatment containing two ingredients is counted as two acre-treatments as is two treatments containing a single ingredient. [5]For corn the percent reflects the share of acres scouted in 1994 for 10 States and the share scouted in 1995 for the remaining 7 States. For soybeans the percent reflects the share of acres scouted in 1994 for 8 States and the share scouted in 1995 for the remaining 6 States. For potatoes the percent reflects the share scouted in 1993 for the 4 leading production States only.

Source: USDA, ERS, 1995 Cropping Practices Survey data.

Table 2—Herbicide and insecticide use on corn, soybeans and winter wheat, by production practices, 1995

	Total area	Herbicides: Percent treated[1]	Herbicides: Avg. No. acre-treatments[1]	Herbicides: Avg. lbs. per acre-treatment[2]	Herbicides: Avg. lbs. per acre[2]	Insecticides: Percent treated[1]	Insecticides: Avg. No. acre-treatments[1]	Insecticides: Avg. lbs. per acre-treatment[2]	Insecticides: Avg. lbs. per acre[2]
Corn (17 States)									
Planted area[3]	64,105	97	2.5	1.09	2.71	28	1.2	0.64	0.75
Area by tillage system:									
Moldboard Plow	5,552	93	2.2	1.10	2.42	24	1.1	0.77	0.88
Conventional w/o moldboard plow	32,754	96	2.4	1.12	2.64	27	1.1	0.66	0.76
Mulch tillage, > 30% residue	12,610	98	2.4	1.09	2.59	31	1.2	0.66	0.79
No till	11,487	99	3.1	1.06	3.24	22	1.1	0.53	0.61
Ridge till	1,702	98	2.6	0.83	2.12	67	1.4	0.48	0.70
Area by number of cultivations:									
No cultivations	22,655	98	2.7	1.11	2.97	20	1.1	0.64	0.70
1 cultivation	29,768	98	2.4	1.10	2.61	27	1.1	0.73	0.81
2 or more cultivations	11,682	92	2.4	1.01	2.41	43	1.3	0.52	0.70
Area by cropping pattern:									
Continuous corn	13,581	96	2.4	1.05	2.54	59	1.3	0.61	0.80
Corn and soybean rotation	29,941	99	2.6	1.12	2.85	12	1.0	0.60	0.62
Other row crops rotation	10,108	97	2.4	1.12	2.69	39	1.1	0.66	0.71
Row crops & small grains rotation	1,770	94	2.5	0.87	2.14	6	id	id	id
Idle or fallow rotation	4,480	94	2.6	1.03	2.65	25	1.1	0.70	0.75
Hay, pasture, other rotation	4,224	93	2.3	1.09	2.50	21	1.2	0.81	0.97
Area by plant density:									
Less than 15,000 plants/acre	2,373	96	2.3	1.18	2.72	12	1.1	0.47	0.50
15,000 - 25,000 plants/acre	22,457	97	2.5	1.12	2.80	25	1.1	0.66	0.74
Over 25,000 plants/acre	18,030	98	2.5	1.09	2.75	29	1.3	0.55	0.69
No available data	21,245	96	2.5	1.05	2.49	31	1.2	0.70	0.81
Area by row spacing:									
under 34 inches wide	30,945	99	2.6	1.11	2.86	25	1.2	0.59	0.69
34 - 39 inches wide	12,424	95	2.3	1.10	2.57	32	1.2	0.66	0.78
Over 39 inches wide	1,047	100	2.3	1.03	2.41	14	id	id	id
No available data	19,689	95	2.5	1.04	2.56	30	1.2	0.69	0.86
Soybeans (14 States)									
Planted area[3]	51,840	97	2.8	0.40	1.12	2	1.1	40	0.49
Area by tillage system:									
Moldboard Plow	3,291	98	2.4	0.42	1.00	id	id	id	id
Conventional w/o moldboard plow	22,436	96	2.7	0.40	1.08	2	1.1	0.44	0.49
Mulch tillage, > 30% residue	10,770	98	2.6	0.37	0.94	1	1.6	0.50	0.78
No till	14,961	99	3.3	0.40	1.34	2	1.0	0.24	0.35
Ridge till	382	id	id	id	id	id	id	id	id
Area by number of cultivations:									
No cultivations	31,102	98	3.0	0.39	1.14	2	1.0	0.35	0.36
1 cultivation	11,956	99	2.6	0.41	1.06	1	id	id	id
2 or more cultivations	8,782	95	2.7	0.40	1.10	4	1.3	0.42	0.54
Area by cropping pattern:									
Continuous soybeans	5,088	94	3.2	0.40	1.28	8	1.2	0.44	0.56
Corn and soybean rotation	29,900	99	2.8	0.38	1.06	1	1.0	0.34	0.34
Other row crops rotation	8,031	98	2.8	0.39	1.08	3	1.1	0.40	0.43
Row crops & small grains rotation	2,293	91	2.9	0.49	1.42	*	id	id	id
Idle or fallow rotation	2,311	95	2.9	0.47	1.33	*	id	id	id
Hay, pasture, other rotation	763	id	id	id	id	id	id	id	id
Double-cropped with wheat	3,454	93	2.5	0.49	1.22	4	1.2	0.34	0.57
Area by plant density:									
Under 75,000 plants/acre	2,808	99	2.6	0.38	0.98	*	id	id	id
Over 75,000 plants/acre	31,211	98	2.8	0.38	1.07	*	id	id	id
No available data	17,821	96	2.9	0.43	1.22	4	1.2	0.43	0.50
Area by row spacing:									
Under 10 inches wide	17,576	98	3.0	0.40	1.21	1	id	id	id
10 - 29 inches wide	8,052	99	2.9	0.34	0.99	1	id	id	id
29-34 inches wide	11,711	99	2.6	0.40	1.03	*	id	id	id
Over 34 inches wide	3,289	99	2.3	0.39	0.89	1	id	id	id
No available data	11,212	48	2.9	0.44	1.23	7	1.2	0.43	0.48
Winter Wheat (13 States)									
Planted area[3]	34,265	56	2.0	0.14	0.28	5.5	1.1	0.34	0.36
Area by tillage system:									
Moldboard Plow	3,735	68	1.9	0.11	0.20	id	id	id	id
Conventional w/o moldboard plow	22,816	56	2.0	0.14	0.28	6	1.1	0.34	0.37
Mulch tillage, > 30% residue	5,274	55	1.9	0.17	0.33	7	1.0	0.34	0.34
No till	2,439	44	2.3	0.16	0.36	id	id	id	id
Area by cropping pattern:									
Continuous wheat or other small grains	14,939	56	1.7	0.10	0.30	10	1.1	0.34	0.36
Wheat fallow rotation	7,015	69	2.3	0.17	0.40	id	id	id	id
Row crops & small grains rotation	5,229	28	2.0	0.16	0.31	id	id	id	id
Idle or fallow rotation	6,289	64	2.1	0.16	0.35	3	1.2	0.29	0.39
Hay, pasture, other rotation	378	id	id	id	id	id	id	id	id
Double-cropped with soybeans	414	id	id	id	id	id	id	id	id
Area by plant density:									
Less than 1 million plants	2,243	63	2.3	0.20	0.46	7	1.0	0.32	0.32
1 - 2 million plants	10,538	57	2.2	0.17	0.37	6	1.1	0.34	0.37
Over 2 million plants	12,670	52	1.9	0.14	0.26	3	1.1	0.39	0.43
No available data	8,814	58	1.7	0.09	0.15	9	1.0	0.32	0.34

id = insufficient data. * indicates less than 1 percent. [1]Includes spot and bt treatments. [2]Excludes spot and bt treatment amounts. [3]See footnote No. 3 to table 1.

Source: USDA, ERS, 1995 Cropping Practices Survey data.

Table 3—Herbicide and insecticide use on cotton and potatoes, by production practices, 1995

	Total	Herbicides				Insecticides			
		Percent treated[1]	Avg. No. acre-treatments[1]	Avg. lbs. per acre-treatment[2]	Avg. lbs. per acre[2]	Percent treated[1]	Avg. No. acre-treatments[1]	Avg. lbs. per acre-treatment[2]	Avg. lbs. per acre[2]
Cotton (6 States)									
Planted area [3]	11,650	97	3.2	0.64	2.03	76	7.9	0.30	2.36
Area by tillage system:									
Moldboard Plow	1,534	99	1.8	0.64	1.14	65	6.1	0.33	2.01
Conventional w/o moldboard plow	9,957	97	3.4	0.64	2.15	78	8.1	0.29	2.39
Mulch tillage, > 30% residue	47	id	id	id	id	id	id	id	id
No till	112	id	id	id	id	id	id	id	id
Area by number of cultivations:									
No cultivations	262	id	id	id	id	id	id	id	id
1 cultivation	673	95	2.6	0.56	1.51	63	8.8	0.30	2.65
2 cultivations	2,978	97	2.7	0.62	1.69	70	7.6	0.30	2.31
3 or more cultivations	7,737	98	3.4	0.65	2.22	80	8.0	0.29	2.33
Area by cropping pattern:									
Continuous cotton	7,938	98	3.5	0.61	2.15	73	8.2	0.29	2.36
Cotton and sorghum rotation	609	id	id	id	id	id	id	id	id
Other row crops rotation	1,843	95	2.7	0.73	1.99	81	7.4	0.32	2.36
Row crops & small grains rotation	205	id	id	id	id	id	id	id	id
Idle or fallow rotation	781	96	1.8	0.78	1.38	81	5.4	0.42	2.26
Hay, pasture, other rotation	274	id	id	id	id	id	id	id	id
Area by plant density:									
Less than 20,000 plants	840	97	2.9	0.64	1.88	67	8.0	0.34	2.67
20,000 to 60,000 plants	7,938	98	3.1	0.63	1.95	80	8.5	0.30	2.59
Over 60,000 plants	1,354	99	2.0	0.66	1.34	63	5.1	0.28	1.43
No available data	1,519	94	4.9	0.66	3.22	71	6.7	0.23	1.57
Area by row spacing:									
Under 34 inches	1,107	100	2.6	0.73	1.89	92	9.2	0.31	2.83
34 to 39 inches	3,159	98	4.1	0.60	2.45	89	10.0	0.29	2.85
Over 39 inches	5,892	98	2.4	0.64	1.52	68	6.5	0.33	2.10
No available data	1,492	94	5.0	0.66	3.27	72	6.8	0.23	1.57
Potatoes (11 States)									
Planted area [3]	1,147	86	2.0	1.23	2.40	88	2.6	0.97	2.55
Area by number of cultivations:									
No cultivations	65	id	2.0	1.25	2.50	94	3.8	0.76	2.89
1 cultivation	487	96	2.1	1.36	2.83	81	2.3	1.14	2.67
2 cultivations	322	81	1.9	1.13	2.12	89	2.7	0.94	2.49
3 or more cultivations	272	73	1.8	0.99	1.74	96	2.7	0.86	2.37
Area by cropping pattern:									
Continuous potatoes	44	id	1.9	0.95	1.81	id	2.7	0.50	1.32
Other row crops rotation	213	91	2.0	0.92	1.83	99	3.4	0.85	2.88
Row crops & small grains rotation	511	79	1.8	1.27	2.32	82	2.0	0.90	1.77
Idle or fallow rotation	263	95	2.1	1.40	2.98	88	2.8	1.20	3.38
Hay, pasture, other rotation	116	87	2.0	1.33	2.68	86	3.4	1.12	3.80

id = insuffient data. [1]Includes spot and bt treatments. [2]Excludes spot and bt treatment amounts. [3]See footnote 3 to table 1.

Source: USDA, ERS, Cropping Practices Survey data.

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